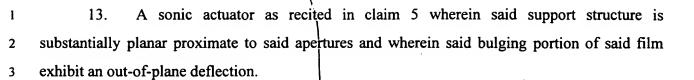
<u>CLAIMS</u>

1	1. A sonic actuator comprising:	
2	a multi-layer membrane including	
3	a non-metallic elastomeric o	lielectric polymer layer having a first
4	surface and a second surface;	
5	a first compliant electrode la	ver contacting said first surface; and
6	a second compliant electrode	layer contacting said second surface;
7/	and	
M	a support structure in contact with said sonic	actuator film.
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1	2. A sonic actuator as recited in claim 1	wherein said non-metallic dielectric polymer
2	is selected from the group consisting essentially of silicone, fluorosilicone, fluoroelastomer,	
3	natural rubber, polybutadiene, nitrile rubber, isoprene, and ethylene propylene diene.	
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1	3. A sonic actuator as recited in claim	wherein said compliant electrode layer is
2	made from the group consisting essentially of gra	phite, carbon, conductive polymers, and thin
3	metal films.	
1	4. A sonic actuator as recited in clair	n 1 wherein said support structure is a grid
2	having a plurality of apertures.	
i	5. A sonic actuator as recited in claim	m 4 wherein said multi-layer membrane is
2	biased such that portions of said film bulge at at lea	st some of said apertures.
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- 6. A sonic actuator as recited in claim 5 wherein said multi-layer membrane is biased such that portions of said film bulge in a first direction at at least some of said apertures.
 - 7. A sonic actuator as recited in claim 5 wherein said multi-layer membrane is biased such that portions of said film bulge in a first direction at some of said apertures and such that portions of said film bulge in a second direction at others of said apertures.

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- 8. A sonic actuator as recited in claim 6 wherein said film is biased by a gaseous pressure that is greater than atmospheric pressure.
- 9. A sonic actuator as recited in claim 6 wherein said film is biased by a gaseous pressure that is less than atmospheric pressure.
- 1 10. A sonic actuator as recited in claim 6 wherein said film is biased by a soft foam 2 material.
- 1 11. A sonic actuator as recited in claim 10 wherein said soft foam material is a closed-2 cell foam with an average cell diameter substantially less than a diameter of said apertures.
- 1 12. A sonic actuator as recited in claim 7 wherein said film is biased by a gaseous pressure that is greater than atmospheric pressure where said film is bulging in a first direction, and is biased by a gaseous pressure that is less than atmospheric pressure where said film is bulging in a second direction.



14. A sonic actuator as recited in claim 1 wherein said multi-layer membrane comprises a sandwich structure having a plurality of layers of non-metallic elastomeric dielectric polymers alternating with a plurality of layers of compliant electrodes.

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- 1 15. A sonic actuator as recited in claim 1 further comprising a square root driver coupled to said first compliant electrode and to said second compliant electrode.
- 1 16. A sonic actuator as recited in claim 15 wherein said square root driver includes a summer adding a low power input signal to an offset voltage and a square root generator coupled to an output of said summer.
 - 17. A sonic actuator as recited in claim 16 further comprising a filter coupled to an output of said square root generator.
- 1 18. A sonic actuator as recited in claim 17 further comprising an amplifier coupled to an output of said filter to provide a signal to drive said multi-layer membrane.